

PATENT SPECIFICATION

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DRAWINGS ATTACHED.

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COMPLETE SPECIFICATION.

Improvements in or relating to Filters.

We, UNIT SWIMMING POOLS LIMITED, a British Company, of 537, Stafford Road, Wolverhampton, Staffordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to filtration equipment.

It is well known to provide a swimming bath with filtration equipment for withdrawing water from the bath, filtering it and returning it to the bath. In many cases the filtration equipment is also arranged for the chemical treatment of the water. The magnitude of the filtration equipment is largely dependent upon the volumetric capacity of the bath and the desired volumetric throughput and in many cases each of the component parts of the filtration equipment is of sufficient size to become an individual unit mounted separately on individual foundations or supports and interconnected with the other units and with the swimming bath by suitable pipework. Of recent years relatively small sized swimming pools have become increasingly popular, frequently in the grounds of private residences, and there is a need for relatively small sized filtration equipment for use therewith and which can be installed as a complete unit.

In general, the minimum requirements for filtration equipment suitable for use with a swimming bath are a filter through which water withdrawn from the bath is passed, a pump unit for withdrawing water from the bath and passing it through the filter and a strainer upstream of the pump to protect the pump. Hitherto the filter, pump unit

and strainer have been separate and individual items.

According to the present invention there is provided a filtration unit in which a pump unit adapted to deliver liquid to a filter, a strainer unit connected upstream of the pump to protect the pump, a valve means adapted to control delivery of liquid to and from the filter and interconnecting pipework are all mounted on or supported by the housing of the said filter to form a unitary structure of which the filter housing forms the sole base or support.

According to another feature of the present invention the pump unit is a combined electric motor and pump, and the valve means is adapted for determining the direction of flow of liquid through the filter and is mounted in and supported by pipework interconnecting liquid inlet and outlets of the filter housing and a liquid outlet of the pump, whilst further pipework connects a liquid outlet of the strainer unit to a liquid inlet of the pump, the filtration unit having a liquid inlet connection communicating with the strainer unit and a liquid outlet connection communicating with the valve means.

The filter housing may conveniently be circular in cross section and a mounting plate for the pump unit and strainer box may be attached thereto, for example by welding, through a pair of vertically extending spacing plates and itself extends in a generally vertical plane. The filter elements in the filter housing are preferably replaceable and each element may be in the form of a hollow frame of an expanded metal an outer fabric coating upon which a layer of filter aid, preferably diatomaceous earth, can be deposited. Each of these frames in-

cludes at one end a bush-like projection adapted to be received in a distributor at a lower level within the tank and into which a pipe connection is made. In normal operation water to be filtered is introduced into the filter tank at an upper level and passes through the filter aid and fabric into the hollow central regions of the frames and thence through the bush-like connection into the distributor and is withdrawn through a pipe connection leading to the distributor. Matter removed from the water so circulated accumulates on the outside of the filter elements and the distributor is preferably spaced some distance above the bottom of the tank so that at least some of the matter extracted from the water can fall under gravity and accumulate in the space between the bottom of the tank and the bottom of the elements; a suitable drain connection is provided communicating with the bottom of the tank. The state of the elements in the filter unit may conveniently be deduced by noting the pressure of water within the tank and a rise of pressure will indicate the need for cleaning the filter elements. Such cleaning can be readily effected by reversing the direction of flow of water through them and the valve means in the form of a change-over valve is provided for this purpose so that water from the pump unit can be delivered to the distributor and therefrom into the hollow inside region of the filter frames. Pressure of water there-within pushes the fabric covering and the filter aid outwardly and, in many cases, dislodges a large proportion of the matter retained thereon, such matter falling to the bottom of the tank for subsequent removal through the drain connection. The tank is preferably provided with a removable cover so that access can be obtained to the filter elements for inspection and replacement.

The pipework and valve means inter-connecting the various units are preferably so arranged to provide ready access to the pump unit and demountable couplings are preferably included in several of the inter-connecting pipes so that the removal of either the pump unit or the strainer box for inspection or servicing can be greatly facilitated.

A filtration unit embodying the present invention is eminently suitable for swimming pools with a volumetric capacity of about 10,000 gallons and through-puts of the order of 25 gallons a minute can be obtained.

The invention will be further described by way of example with reference to the drawings accompanying the provisional specification and in which:—

Fig. 1 is a plan view of a preferred embodiment of the invention;

Fig. 2 is a partial side elevation with certain parts omitted;

Fig. 3 is a partial end elevation partly in section and with certain parts removed for the sake of clarity;

Fig. 4 is a section along the line IV—IV of Fig. 1, and

Fig. 5 is a detail view partly in section along the line V—V of Fig. 4.

A filtration unit embodying the present invention comprises a filter tank unit indicated generally at 10, on one side of which are mounted a strainer box 11, and a pump unit 12. Inlet and outlet connections 13, 14, of the filter tank 10 are connected to fluid outlet 15 of a pump 16 forming part of the pump unit 12 and to an outlet valve 17 through a control valve 18 by a connection 19, pipework 20, pipework 21, and a pipe 22. Thus the valve 18 is effectively also mounted on the filter tank unit 10. The strainer box 11 has an inlet connection 23 which is extended to an inlet valve 24. The pump unit 12 comprises an electric motor 25 on an extension of the frame on which is mounted the pump 16 which has an inlet connection 26 which is in communication with an outlet connection 27 of the strainer box 11 through a demountable coupling 28. The pump 16 is mounted below the motor 25 and their axis of rotation is vertical. A demountable coupling 29 is included in the pipework 21 between the outlet connection 15 of the pump 16 and the valve 18.

For mounting the pump unit 12 and the strainer box 11 on the filter tank unit 10, a mounting plate 30, which extends generally vertically, is attached to the side of the filter tank unit 10 by means of a pair of spacing plates 31, 32. Four suitably spaced holes are drilled in the mounting plate 30 as at 33 to enable the pump unit 12 to be attached by means of nuts and bolts 34 extending through its base plate 35 and the mounting plate 30. A splash plate 36 is provided above the motor 25 of the pump unit 12. If it is desired to remove the pump unit for service or inspection, this can be done readily by breaking the couplings 28, 29 and removing the nuts and bolts 34. The mounting plate 30 is also suitably drilled to receive a bolt 37 for attaching the strainer box 11 thereto.

The filter tank unit 10 comprises a vertical cylindrical tank 38 having an inclined bottom plate 39 just below a drain outlet connection 40. A removable dome-shaped cover 41 for closing the top of the tank 38 is provided with an internal peripheral recess 42 containing sealing packing 43 for engaging the rim of the tank 38 and with sidewardly extending lugs 44 to receive clamps 45 attached to brackets 46 and secured to the outside of the tank 38. Towards the bottom of the tank 38 is the outlet connection 14 in the form of a pipe

which extends towards the centre of the tank 38 and carries at its inner end a flange 47 to which is attached by means of bolts 48 a distributor 49 having on its upper face sockets 50 to receive connecting bushes 51 of filter frames 52.

In the embodiment disclosed two filter frames 52 are provided and the distributor 49 has two sockets 50. Each of the filter frames comprises two sheets of expanded metal spaced from one another and suitably connected around their edges, with a bush 51 communicating with the space between the sheets. The frame is enclosed in an envelope of fabric upon which a suitable filter aid, such as diatomaceous earth, is deposited conveniently by introducing the filter medium into the strainer box 11 when the filter frames are first brought into use. A rod 53 extends upwardly from the distributor 49 and is screw-threaded at its upper end 54 which passes through a retainer bar 55 and receives a wing nut 56 to enable the filter frames 52 to be maintained in position. At an upper level of the tank 38 is the inlet connection 13 and in the region of this there is attached to the inside wall of the tank 38 an L-shaped baffle 57, the base of which is drilled at 58. The cover 41 has a pipe connection 59 communicating with a T-piece 60 to receive a pressure gauge 61 and communicate through a tap 62 with a bleed pipe 63.

The relative masses of the filter tank unit 10 on the one hand, and of the pump unit 12, the strainer box 11, the valve 18 and the associated pipework on the other hand are preferably such that when there is no water in the tank unit 38, the weight of the tank unit 10 more than balances the weight of the remainder so that the filtration unit can be free-standing as a composite unit. In case the mass of the filter tank unit 10 should be not quite sufficient and there would be a tendency for the filtration unit to pivot about the edge 64 of the tank 38, a single fixing bracket 65 is provided at the bottom of the tank 38 at a diametrically opposed position.

The filtration unit described is an integral structure and, in order to instal it in conjunction with a swimming bath, in addition to electric connections to the motor 25 of the pump unit 12, it is only necessary to connect the inlet valve 24 to a suction pipe leading to the bath and to connect the outlet valve 17 to a pipe for delivery of water to the bath. When initially put into operation, a filter aid such as diatomaceous earth, is preferably introduced into the strainer box 11 and the valve 18 is operated into the position marked "filter" such that water from the bath is drawn by the pump 16 through the strainer box and is directed by the valve 18 to the inlet connection 13

of the tank 38. The tap 62 is opened to permit the escape of air from inside the tank and the level of water rises inside the tank until it is substantially full of water as will be indicated by the escape of water through the tap 62 which is then closed. Filter aid introduced into the strainer box 11 is brought into the tank 38 by the water and becomes deposited on the fabric material surrounding the filter frames, the presence of the baffle 57 prevents the water from impinging directly on the filter frames and the presence of the hole 58 in the baffle is found to improve the distribution of filter aid over the fabric of the filter frames. Filtered water passes through the filter frames into the distributor 49 and emerges through the outlet connection 14 whence it is directed by the valve 18 to the outlet valve 17. Progress of filtration can be determined by observing the pressure inside the tank 38 as indicated by the pressure gauge 61. As extracted matter builds up on the outside of the fabric of the filter frames, the pressure indicated by the pressure gauge 61 will rise and the need for cleaning the fabric of the filter frames can be deduced from such rise in pressure. To this end the valve 18 is moved through an "off" position into a position labelled "backwash". With the inlet valve open, water from the pump 16 is now directed by the valve 18 into the outlet connection 14 and thus into the inside of the filter frames 52 urging the fabric outwardly and dislodging entrained material therefrom; such entrained material collects above the bottom plate 39 of the tank 38 and can be removed from time to time, by opening a drain valve 66 connected to the drain connection 40. Water can, of course, be returned to the pool if the outlet valve 17 is opened.

The embodiment described is compact and having a nominal throughput of 25 gallons per minute and suitable for use with a swimming bath having a volumetric capacity of up to about 10,000 gallons may well only require a floor space of 2ft. square. A unit embodying the present invention is substantially self-contained and need not require special foundations or supports, can be easily installed and be simple but effective in operation.

WHAT WE CLAIM IS:—

1. A filtration unit in which a pump unit adapted to deliver liquid to a filter, a strainer unit connected upstream of the pump to protect the pump, a valve means adapted to control delivery of liquid to and from the filter and interconnecting pipework are all mounted on or supported by the housing of the said filter to form a unitary structure of which the filter housing forms the sole base or support.

2. A filtration unit as claimed in claim 1 in which the pump unit is a combined electric motor and pump, and the valve means is adapted for determining the direction of flow of liquid through the filter and is mounted in and supported by pipework interconnecting liquid inlet and outlets of the filter housing and a liquid outlet of the pump, whilst further pipework connects a liquid outlet of the strainer unit to a liquid inlet of the pump, the filtration unit having a liquid inlet connection communicating with the strainer unit and a liquid outlet connection communicating with the valve means.

3. A filtration unit as claimed in claim 1 or 2 in which the filter housing is circular in cross section and in which a mounting plate for the pump unit and strainer unit is attached thereto through a pair of vertically extending spacing plates and extends in a generally vertical plane.

4. A filtration unit as claimed in claim 3 in which the pump unit comprises an electric motor and a pump mounted on an extension of the frame of the motor.

5. A filtration unit as claimed in claim 4 in which the motor and pump are mounted with their rotational axis vertical with the pump below the motor.

6. A filtration unit as claimed in claim 5 in which a splash plate is provided above the motor.

7. A filtration unit as claimed in any preceding claim in which the filter elements contained in the filter housing, are replaceable filter elements.

8. A filtration unit as claimed in claim 7 in which each of the filter elements comprises a hollow frame of an expanded metal supporting an outer fabric coating upon which a layer of filter aid can be deposited.

9. A filtration unit as claimed in claim 8 in which the filter aid is diatomaceous earth.

10. A filtration unit as claimed in claim

8 or 9 in which each of said hollow frames includes at one end a bush-like projection adapted to be received in a distributor at a lower level within the filter housing and into which a pipe connection is made.

11. A filtration unit as claimed in any of claims 8, 9 or 10 in which the filter housing has an inlet connection opening into the housing at an upper level and has an inverted L-shaped baffle on its inside wall in the region of the inlet connection.

12. A filtration unit as claimed in claim 11 in which the L-shaped baffle is apertured in its base.

13. A filtration unit as claimed in any preceding claim in which the filter housing has a bottom plate which slopes downwardly and in which a drain outlet connection is provided in the region of the lowermost portion of the bottom plate.

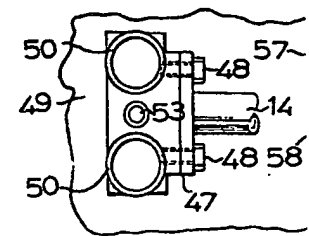
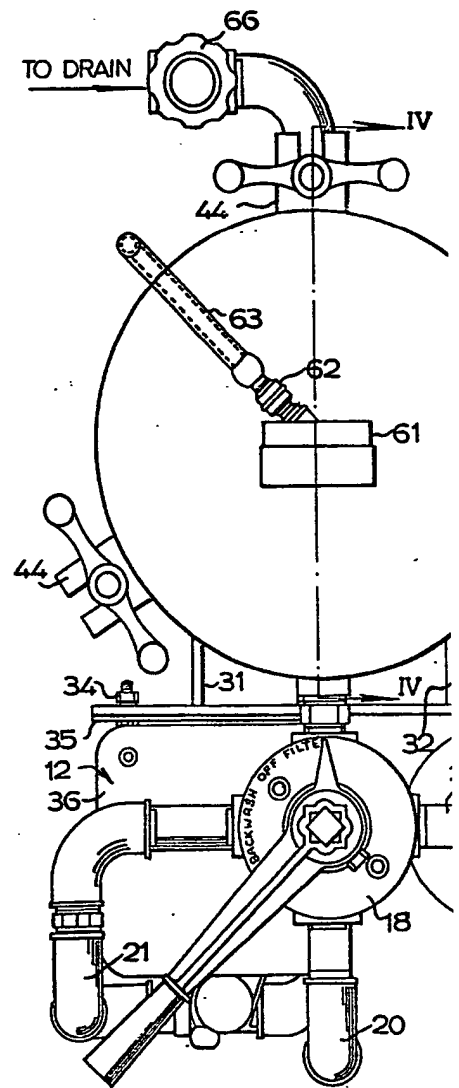
14. A filtration unit as claimed in any preceding claim in which the filter housing has a removable cover provided with a bleed outlet communicating with a bleed-tap and a pressure gauge.

15. A filtration unit as claimed in claim 14 in which the cover is dome-shaped.

16. A filtration unit as claimed in any preceding claim in which pipework interconnecting the valve means, the filter housing, the strainer unit and pump unit include demountable couplings to permit the removal of either the pump unit or the strainer unit.

17. A filtration unit constructed and arranged and adapted to be operated substantially as hereinbefore particularly described with reference to and as illustrated in the drawings accompanying the provisional specification.

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4 SHEETS

**This drawing is a reproduction of
the Original on a reduced scale
Sheets 1 & 2**



FIG.2.

